Small Business Innovation Research/Small Business Tech Transfer

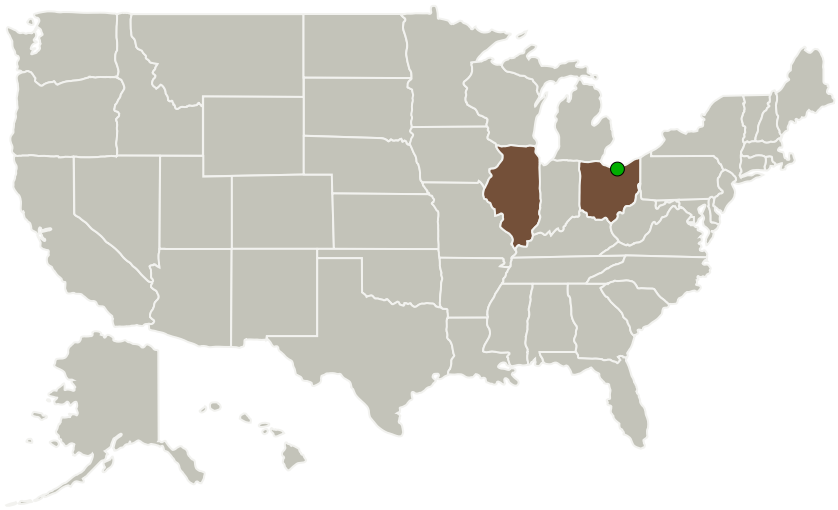
Development of Advanced Anti-Reflection Coatings for High Performance Solar Energy Applications, Phase I

Completed Technology Project (2013 - 2013)

Project Introduction

MicroLink and its subcontractor Magnolia Solar will develop and demonstrate advanced anti-reflection coating (ARC) designs that will provide a better broadband and angular response than that of current coatings. Advanced coatings of this nature are needed to realize the full potential forthcoming generation of multi-junction solar cells that will contain four or more junctions. We will undertake several approaches to this problem: * investigate new dielectric materials that will allow a refractive index intermediate between those of the materials that are currently in common use as ARCs; * investigate a dielectric codeposition processes that will allow the fabrication of materials with a wide range of refractive indices; and * investigate oxidation of Al-containing III-V semiconductor compounds as a mechanism for forming a more transparent window layer. Based on the results of these investigations, we will fabricate and test on III-V triple-junction solar cells the best-identified candidates for improved anti-reflection coating. If successful, the new coating designs will have a reflectance less than 5% over the spectral range 300 nm to 1800 nm and over a wide range of incident angles. The coatings will be completely compatible with inverted metamorphic (IMM) multi-junction solar cell technology and will be optically matched to IMM solar cells. We expect the new coatings will enable a relative efficiency increase of at least 7%, corresponding to a 2.5% absolute efficiency increase.

Primary U.S. Work Locations and Key Partners



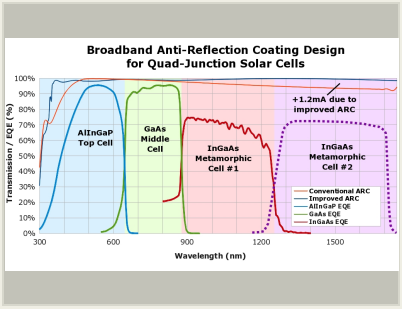


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Table of Contents

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Organizations Performing Work	Role	Type	Location
MicroLink Devices, Inc.	Lead Organization	Industry Minority-Owned Business	Niles, Illinois
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Illinois	Ohio

Project Transitions

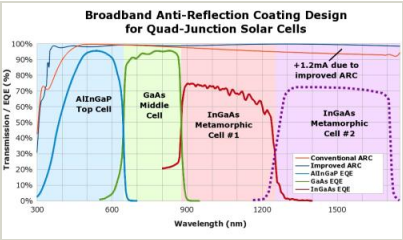
May 2013: Project Start

November 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140451)*

Images



Project Image
Development of Advanced Anti-Reflection Coatings for High Performance Solar Energy Applications
(https://techport.nasa.gov/image/127570)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

MicroLink Devices, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

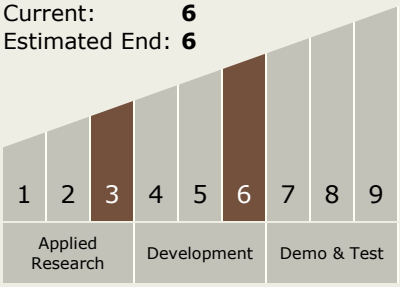
Carlos Torrez

Principal Investigator:

Victor C Elarde

Technology Maturity (TRL)

Start: **3**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.1 Power Generation and Energy Conversion
    - TX03.1.1 Photovoltaic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System